Applying and Qualifying for Apprenticeship in the Electrical Industry

Information for Applicants

For additional information, visit our website at www.njatc.org

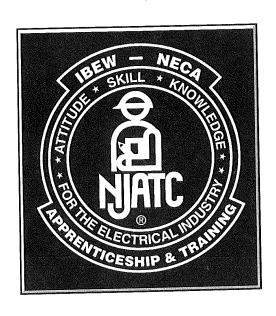


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A Message to Applicants

The National Electrical Contractors Association (NECA) and the International Brotherhood of Electrical Workers (IBEW) jointly sponsor apprenticeship training programs that offer you the opportunity to earn wages and benefits while you learn the skills needed for a trade that can be both challenging and rewarding. You literally Earn-While-You-Learn. As an apprentice, you will have the chance to use your mind, as well as your physical skills, to complete work in a variety of settings with the constant opportunity to learn something new.

This booklet is intended to help you make an informed decision about whether or not you would like to pursue an electrical apprenticeship. It will explain how the application process works. It has three primary parts:

- I. Learning About Electrical Work—provides information about the work done in different electrical work specialties and the abilities those specialties require. It contains an abilities checklist you can complete to determine whether or not electrical work suits you.
- II. APPLYING FOR APPRENTICESHIP—provides information about qualification requirements and the application process. It contains a reminder list to help you with the testing process.
- III. Sample Test Items—provides sample questions and answers for the NJATC Aptitude Test Battery, a part of the application process.

Electrical Work Specialties

What is it like to work in the electrical industry? There are three primary specialties in electrical work:

- Inside Wireman—primarily perform electrical construction work in commercial and industrial settings.
- Outside Lineman—primarily perform electrical work for transmission and distribution of electrical energy.
- Residential Wireman—perform electrical construction work in residential settings.

By far, Inside Wireman is the largest of the three electrical work specialties. Nationally, the Inside Wireman position has over 200,000 Journeymen and apprentices who are members of the IBEW. Just as important, though fewer in numbers, are the Outside Linemen and Residential Wiremen.

Training programs vary in length for the three electrical work specialties. Inside Wireman apprenticeship programs are five years; Outside Lineman programs are three and a half years, and Residential Wireman training takes three years.

The following pages provide additional information about each of the three specialties. An abilities checklist, designed to help you determine how well suited you are for electrical work, appears at the end of this section.

Inside Wireman

Inside Wiremen install conduit, electrical wiring, fixtures and electrical apparatus inside commercial buildings and in a multitude of industrial settings. Major duties for Inside Wiremen include:

- Planning and initiating projects
- Establishing temporary power during construction
- Establishing grounding systems
- Installing electrical service to buildings and other structures
- Establishing power distribution within a project
- Planning and installing raceway systems
- Installing new wiring and repairing old wiring
- Providing power and controls to motors, HVAC, and other equipment
- Installing receptacles, lighting systems, and fixtures
- Troubleshooting and repairing electrical systems
- Installing and repairing traffic signals, outdoor lighting and outdoor power feeders
- Installing fire alarm systems

In performing these duties, Inside Wiremen must use many different kinds of tools, ranging from simple one and two-hand tools (such as wire cutters, screwdrivers, and cable-cutters) to power-assisted tools like electric drills and cable pullers. They occasionally operate heavy equipment such as trenchers and aerial lifts.

Over the course of the five-year Inside Wireman apprenticeship program, apprentices must acquire a wealth of technical knowledge. A recent job analysis identified 83 specific knowledges that are

important for successful job performance. A few of the most important ones are knowledge of:

- The National Electrical Code
- How to work with energized circuits
- Blueprints, including symbols used
- Electrical schematic diagrams
- State and local electrical codes
- First Aid
- Hazardous materials
- Specific job safety rules

Some of the most important skills to be learned are:

- Skill at performing CPR
- Skill at reading a wire table to determine conductor size required
- Skill at terminating aluminum or copper cable
- Skill at terminating high voltage cable
- Skill at splicing high voltage cable

Outside Lineman

While Inside Wiremen install conduit, electrical wiring, fixtures and electrical apparatus, Outside Linemen are often observed climbing poles or in bucket trucks, installing or repairing electrical power lines out-of-doors. Major duties of the Outside Lineman include:

- Planning and initiating projects
- Establishing OSHA and customer safety requirements
- Setting towers and poles and constructing other devices to support transmission/distribution cables
- Establishing work positions for maintaining and repairing overhead distribution or transmission lines
- Stringing new wire or maintaining old wire
- Installing and maintaining insulators
- Installing and maintaining transformers and other equipment

In performing these duties Linemen use climbing tools, hand tools, and heavy equipment on a daily basis.

Like Inside Wiremen, Linemen also need to develop a great deal of technical knowledge during their apprenticeship. A recent job analysis identified 77 knowledge areas that are important for successful performance.

A few of the more important ones are knowledge of:

- How to work with energized circuits
- How to perform an emergency rescue
- First Aid
- Connections to be made for various transformers
- What makes a wooden pole unsafe to climb
- Delta and Wye transformer connections
- Specific job safety rules
- Appropriate hand signals to use with ground crew or equipment operators
- The proper knot to tie in different circumstances
- Blueprints, including symbols used

Some of the most important skills for Linemen are:

- Skill at working on high voltage lines while wearing protective quipment such as rubber gloves
- Skill at performing CPR
- Skill at rigging equipment
- Skill at tying knots
- Skill at operating a bucket truck
- Skill at splicing high voltage cable
- Skill at splicing aluminum or copper cable
- Skill at driving heavy equipment, vehicles, and trucks

Residential Wireman

Residential Wiremen work solely in residential settings (single and multi-family dwellings). Major duties for Residential Wiremen include:

- Planning and initiating projects
- Establishing temporary power during construction
- Establishing grounding systems
- Installing underground systems (slab/foundation)
- Rough-in (frame stage)
- Installing wire and cable
- Trim out
- Perform "hot" checks
- Troubleshooting and repairing electrical systems

In performing these duties, Residential Wiremen must use many different kinds of tools, ranging from simple one and two-hand tools (such as wire-cutters and screwdrivers) to power-assisted tools like electric drills and screw guns. They occasionally operate heavy equipment such as trenchers.

Over the course of the three-year Residential Wireman apprenticeship program, apprentices must become competent in many technical areas. A recent job analysis identified 85 specific knowledges that are important for Residential Wireman job performance.

A few of the most important ones are knowledge of:

- The National Electrical Code
- How to work with energized circuits
- Blueprints, including symbols used
- Electrical schematic diagrams
- State and local electrical codes
- The principles of grounding
- First Aid
- Hazardous materials
- Specific job safety rules
- Proper wire/cable to use in different circumstances

Some of the most important skills to be learned are:

- Skill at performing CPR
- Skill at reading a wire table to determine conductor size required
- Skill at terminating aluminum or copper cable
- Skill at splicing twisted pair cable
- Skill at terminating twisted pair cable
- Skill at terminating coaxial cable

Abilities Checklist

Electrical work can be challenging, complex, physically demanding, and very rewarding. We have found that applicants who have not worked on construction projects, received training, or who do not have friends or relatives in the industry are often unfamiliar with the wide range of tasks electrical workers perform, or the skills needed today to be a successful electrical worker. NJATC has prepared the following checklist to help prospective applicants measure their interest in day-to-day electrical work, and whether they will have the ability to succeed at the completion of their apprenticeship.

Thirty-five core abilities important for all three electrical worker specialties are listed on the following pages. The boxes to the left of each ability provide space where you can indicate your interest in, and capability to perform the ability. If you are *interested* in performing work that requires the ability, place a checkmark under the column labeled "Interest." If you believe that you are *capable* of performing work that requires the ability, place a checkmark in the "Capability" column. In a few cases you might be unsure about your capability, especially if you have not worked with blueprints or technical documents. Consider your interest and capability based upon similar activities, such as automotive repair.

Interest	Capabil	ity .	Ability to
		1.	add, subtract, multiply, and divide and use algebraic formulas
		2.	read complex technical documents written in English
		3.	develop alternative solutions to a problem and choose the best alternative
Q .		4.	communicate in writing with others
		5.	read and understand graphs, charts, and diagrams
		6.	plan and organize tasks to meet deadlines
		7.	understand how an electrical or mechanical system works
		8.	picture the way a construction project will appear before it is finished
		9.	be self-motivated, responsible, and dependable without close supervision
		10.	remain calm in an emergency situation
		11.	communicate orally with others in English
		12.	work smoothly with others as a team to complete a task

Interest	Capability	ı A	bility to
		13.	maintain good relations with others in a work setting
		14.	discriminate between colors
	Q	15.	understand verbal instructions and warnings, given in English
		16.	hear warning signals
		17.	maintain balance and perform construction tasks while on a ladder
	Q	18.	coordinate body movements when using tools or equipment
		19.	reach and stretch to position equipment and fixtures while maintaining balance
		20.	bend or twist the body into unusual positions while working
		21.	traverse irregular surfaces while maintaining balance
		22.	perform physical tasks all day without becoming overly tired
		23.	use hands to manipulate small wires and objects
		24.	work with both hands
		25.	operate two-handed power equipment

Interest	Capabili	ty .	Ability to
		26.	regularly lift objects weighing up to 50 pounds
		27.	on occasion, lift objects weighing over 50 pounds
		28.	carry objects weighing up to 50 pounds for short distances
		29.	apply muscular force quickly to objects and equipment
		30.	push, or pull, heavy objects into position
		31.	climb ladders and poles up to 25 feet in height
		32.	work at heights
		33.	work in extreme hot and cold temperature conditions
		34.	work in a noisy environment
Q		35.	work at depths, such as in trenches, manholes or deep vertical shafts

A particular employer might not require every one of these abilities for every electrical worker, and the importance of each ability may vary by the type of electrical job or employer, and the level of experience. Many electrical contractors are required by federal or state law to consider making reasonable accommodations for otherwise qualified employees with disabilities, and in some cases accommodations might be available. Our research has shown, however,

that these abilities are significant on most job sites, and they are all usually needed in order to perform the essential functions of the job of an electrical worker. That is why all of these abilities, and others, are usually viewed by the NJATC as necessary to successful completion of any electrical apprenticeship program.

If you checked many of the abilities, you may be well-suited for electrical work. If you checked relatively few abilities, or were unsure about checking them, you should take steps to learn more about electrical work. The fact that you do not have or cannot acquire a particular ability does not prevent you from applying for the apprenticeship programs, but it could present a problem during your training and/or on the job. Some preparatory steps you can take include:

- Look for books on electrical construction work in the library.
- Access the NJATC website at: www.njatc.org. It provides detailed job descriptions for the three electrical work specialties and other relevant information.
- Ask the Training Director at the IBEW/NECA training center in your area whether he or she could refer you to someone in the electrical industry who can answer any questions you may have.

Learning more about the work done by electrical workers will help you determine how well suited you are for a career in electrical construction.

The Application Process

To apply for any of the electrical apprenticeship programs, you must first complete an application form. Your application will be evaluated to determine whether or not you meet the following basic requirements:

- Be a minimum of 18 years of age at time of selection and indenture—some areas have a minimum application age of 17.
- Show evidence of successful completion of one full year of high school algebra with a passing grade, or one post high school algebra course with a passing grade
- Be at least a high school graduate, or have a GED, or in lieu of a high school diploma or GED, have a two-year Associate Degree or higher
- Provide an official transcript for high school and post high school education and training. If applicable, GED records must be submitted

The algebra and high school graduation requirements can be waived if you have been working in the electrical construction industry and meet specific work hour requirements (must be documentable).

If you meet the basic requirements, you will be scheduled to take the NJATC apprenticeship test battery. The test battery consists of three (3) tests. It will take approximately two and a half hours to complete. The number of items and the amount of time allotted for each test are shown on the next page:

Name of Test	Number of Items	Number of Minutes
Algebra and Functions	33	46
Reading Comprehension	36	51
Spatial Ability	18	10

You will take a short break between the Algebra and Functions Test and the Reading Comprehension Test.

Approximately two to four weeks after you take the test battery, your local Joint Apprenticeship and Training Committee will receive the results. They will subsequently notify you concerning the disposition of your application. A full six (6) months must elapse before you may retake the test. If you have taken the test battery within the past six months, you may not take it again until six months have passed. Please Note: Willful attempts to Violate this rule may result in Permanent disqualification.

If you obtain a qualifying score on the test battery, you will be scheduled for an oral interview. You will be interviewed by a committee representing both NECA and the IBEW. Based on the interview (including a review of your qualifications), you will receive an overall ranking. As new positions become available in the apprenticeship program, names will be taken off the respective eligibility list in order of the ranking score. Your name will be kept on the eligibility list for two (2) years. If you are not selected to begin an apprenticeship during that two-year period, you will need to reapply if you are still interested.

Some apprenticeship programs have additional basic requirements such as drug testing, a physical examination, or possession of a valid driver's license

A Note to Those with Disabilities

We recognize and comply with our obligations under the Americans with Disabilities Act to not discriminate against qualified persons with disabilities.

If you are a person with a physical or mental impairment (including learning disabilities) that you believe may affect your ability to complete any aspect of the application process (including testing) and if you need an accommodation to ensure that the test battery accurately measures your skills and abilities, please notify the AJATC/JATC, as soon as possible, and no later than upon receipt of notification that you are scheduled to take the NJATC test battery. Accommodation requests given on the test day cannot be addressed that day. In most cases, you will need to provide:

- 1. documentation of your disability and,
- 2. documentation of the need for a particular accommodation.

Your request will be considered promptly.

Questions and Answers

Q. If I do not score well on the tests, can I take them again?

Yes, you may take the test battery again after a period of six (6) months has elapsed from your most recent test date.

Q. Are there any penalties for guessing on the tests?

No, there are no penalties for guessing. Your score will be based on the number of items you answer correctly.

Q. Should I work as fast as I can when taking the tests?

Most applicants will find they have plenty of time to complete each of the tests without rushing. You should work steadily and carefully. Do not spend too much time on any one question.

Q. Should I study to do better on the tests?

You should review the sample questions in this booklet. If you find that certain types of questions are difficult for you, you can review material that is similar to those questions. However, there is no need to memorize certain formulas or factual material in order to do well on the tests. **Previous knowledge of electrical work is not required.**

Q. Will I receive a report of my score?

You will be informed whether or not you have received a qualifying score. Exact scores are not provided.

Q. What if I become ill or have an emergency on the day of the tests?

If you are unable to attend the test session for which you are scheduled, you should contact the local Joint Apprenticeship and Training Committee to see if you can take the tests at another time. Rescheduling is <u>not</u> guaranteed.

Q. What should I bring on the day of the tests?

Remember to bring a **photo ID** to the test session. Pencils and all other materials will be provided. You will <u>not</u> be able to use a calculator for the tests.

Q. If I have to leave before I finish all of the tests, can I complete the tests another day?

No. If you do not complete all of the tests, your score will be based on the questions you do complete. The tests must be completed during your test session. You cannot finish the tests on another day. You will not be able to reschedule to take the tests again for a minimum of six (6) months.

Reminders for Applicants

- For optimal test performance, get a good night's rest and eat a nutritious meal prior to taking the tests.
- Report to the test center early. It is a good idea to arrive at the test center at least 15 minutes before the scheduled testing time.
- On your scheduled test day, remember to bring a photo ID with you to the testing center. Your ID will be checked before you will be allowed to take the tests. No ID, No test, No exceptions!
- Do **not** bring a calculator. If you bring a watch with a built-in calculator, you will be asked to remove it during the test session.
- Plan on spending at least 3 hours at the test center on your scheduled test day.
- Be sure to make arrangements for child care ahead of time. Children will not be allowed at the test center.
- **Do not** attempt to retake the test battery for **6 months** after your last test date. If you retest before the 6 month period has elapsed, your score will not be valid and you will not be allowed to retest for *another* 6 months.
- Make arrangements with the JATC before you are scheduled for testing if you will need special accommodations during the testing procedure.

For Your Information:

These tests are validated for use by sponsors of electrical apprenticeship programs. They have been developed to help in the selection of apprentices for the respective apprenticeship programs.

The fact that an applicant is not scheduled for an oral interview, as a result of this test battery, does *not* speak to that applicant's ability, or lack thereof, to be most successful in many other occupations. This test was specifically developed to assist our program sponsors—helping them to select those who are most likely to succeed in our apprenticeship programs.

Many apprenticeship programs receive large numbers of applications, that is, four, five, six or more times the number of new apprenticeship openings—as defined by a limited number of job and training opportunities being available at a given time. The validated testing instrument is a tool to assist in the selection of the very best applicants—those who have an aptitude that matches job performance requirements. In this way, the number of applicants brought to the interview table is based upon objective, equitable, job-related criteria.

Instructions for the Sample Test

As part of the selection process, you will be required to take an aptitude test battery designed to determine whether you possess the abilities that will help you succeed within the electrical construction industry. The following pages provide a description of each of the tests and some sample test questions. These questions are similar to those on the actual tests, allowing you to know what to expect on the day of your test session.

You may use these items as a sample test and then check your answers with the key that appears on page 28 of this booklet. A sample test answer sheet is shown on page 27. You may remove this answer sheet by cutting along the dotted line. This allows you to use it without turning back and forth. Record your answers to the sample questions on the answer sheet.

You should read the sample questions on each test carefully and then examine each of the responses. Only one answer is correct for each question. Choose the response that you think is correct, then mark your answer on the answer sheet by blackening the letter that corresponds to your answer. When you are finished, turn the answer sheet over and check your answers with the key on page 28.

If you find that some of the sample items are difficult for you, you may want to review material that is similar to the sample items.

Remove the answer sheet on page 27.

Sample Algebra and Functions

This is a test of your ability to solve problems using algebra. Two sample questions are shown below.

1. Consider the following formula:

$$A = B + 3(4 - C)$$

If B equals 5 and C equals 2, what is the value of A?

- A. 7
- B. 11
- C. 12
- D. 17
- 2. Consider the following formula:

$$y = 3(x + 5)(x - 2)$$

Which of the following formulas is equivalent to this one?

- A. $y = 3x^2 + 9x 30$
- B. $y = x^2 + 3x 10$
- C. $y = 3x^2 + 3x 10$
- D. $y = 3x^2 + 3x 30$

3. Consider the following equation:

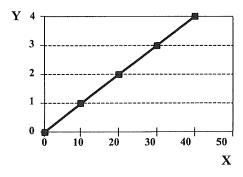
$$Y = X + 5$$

Which of the following choices represents the same relationship as demonstrated in this equation?

- A. <u>Y</u> <u>X</u> 5 10 10 15 15 20 20 25
- B. Y is equivalent to the sum of a constant C and X, where C equals 5.

C.
$$Y = (X + 20)/4$$

D.



Sample Reading Comprehension

This test measures your ability to obtain information from written passages. You will be presented with a passage followed by a number of questions about it. A sample passage is shown below, followed by three sample questions. This passage is shorter than those on the actual test.

Passage

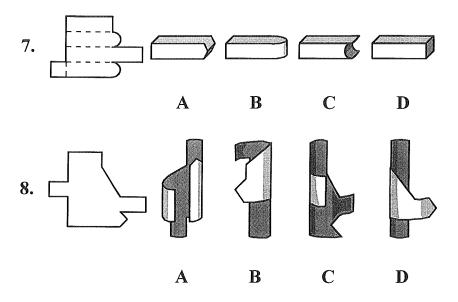
The timing of New Year's Day has changed with customs and calendars. The Mayan civilization, on what is now called the Yucatan peninsula of Mexico, celebrated the new year on one of the two days when the noonday sun is directly overhead. In the equatorial regions of the earth, between the Tropics of Cancer and Capricorn, the sun is in this position twice a year, once on its passage southward, and once on its passage northward. At the early Mayan city of Izapa in the southern Yucatan, the overhead date for the sun on its southward passage was August 13. The Mayans celebrated this as the date for the beginning of the new year. Later, at the more northerly Mayan site of Edzna, the corresponding overhead date is July 26. Analyses of Mayan pictorial calendars indicate that they celebrated the new year on August 13 prior to 150 AD, and on July 26 after that year. This change has been explained by archaeological dating showing that 150 AD was the time that the Mayans moved the hub of their civilization from the southern to the northern site.

- 4. According to the passage, the sun at Edzna was directly overhead at noon on:
 - A. July 26 only
 - B. August 13 only
 - C. July 26 and one other date
 - D. August 13 and one other date
- 5. If the Mayans had moved their civilization's center south of Izapa, their new date for celebration of the new year would probably have been closest to which of the following dates?
 - A. January 1
 - B. February 20
 - C. March 25
 - D. September 15
- 6. Why did the Mayans move their capital city from Izapa to Edzna?
 - A. The climate at Edzna was more temperate.
 - B. Lunar eclipses were more visible at Edzna.
 - C. The terrain near Edzna was more suitable for agriculture.
 - D. Cannot be determined from the information given.

Sample Spatial Ability

This is a test of your ability to assemble three-dimensional objects in your mind from two-dimensional representations. You will be presented with a picture of a piece of paper with folds and cuts, followed by four (4) three-dimensional objects. You must decide which of the three-dimensional objects could be made by folding or rolling the piece of paper.

Two sample questions are shown below.





Sample Test Answer Sheet

You may wish to remove this answer sheet from the booklet, making it easier to use when answering the sample questions

Sample Algebra and Functions

- 1. (A) (B) (C) (D
- 2. (A) (B) (C) (D
- 3. (A) (B) (C) (D)

Sample Reading Comprehension

- 4. (A) (B) (C) (D)
- 5. A B C D
- 6. A B C D

Sample Spatial Ability

- 7. A B C C
- 8. A B C C



Answer Key

Algebra and Functions

I. B

A .2

3. B

Reading Comprehension

ď C

2. D

D .9

VillidA laiteq

7. B

A .8

WHEN SEARCHING FOR A CAREER...

Always inquire about health insurance, pensions, and other benefits, as well as wage structure.

Be sure to differentiate between what is "fact" and what is "promised." Promises don't pay doctor bills, make car payments or cover the rent—wages and benefits do! Some things, that simply don't seem that important today, will eventually be extremely important to every working man and woman in this country.

Electrical Construction Work is...

DEMANDING

INTERESTING

DANGEROUS

EXCITING

MOBILE

FUN

DIRTY

SEASONAL

REWARDING

EXHAUSTING

CHALLENGING

